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⑯ ⑰ **CANADIAN PATENT**

⑱ **BREATHING AID**

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Granted to Hudson Oxygen Therapy Sales Company,  
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No. OF CLAIMS 8

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A breathing aid device commonly referred to as an airway has been in use for some time. A particular type of airway is characterized by an elongated and generally tubular construction having an arched or curved portion and a neck portion extending from one end of the arched portion. The device is placed into a patient's mouth with the arched portion lying over the tongue. When in place, the forward end of the arched portion is located in the upper pharyngeal region while the neck portion passes between the patient's upper and lower teeth and lips. A flattened flange is usually also present on the end of the neck portion to prevent the device from further entering the mouth or extending deeper into the pharynx and avoid choking.

An airway is used extensively on patients to which an anesthetic has been administered such as during surgery or who is otherwise unconscious in order to maintain a direct air passage between the lips and pharynx. Since the arched portion of the device lies over the patient's tongue and extends into the upper pharyngeal region the tongue is prevented from falling into the throat which would otherwise cause blockage of the pharynx and disrupt the breathing passageway. The device also finds use in resuscitation or rescue breathing. Oxygen containing gases may be administered into the airway through the forward end opening or the patient may breath himself without the aid of gases from another source by both inhaling and exhaling through the airway. In other words, the device simply maintains an air passage from the pharynx through the mouth and lips.

During surgery with an unconscious patient it is often necessary to extend a catheter into the pharyngeal region to avoid choking caused by congestion interfering with the upper respiratory tract. The catheter is extended into the congested area and is attached to a vacuum producing force for extracting the congestive material from the patient's respiratory tract or trachea through the catheter. Since an airway as above described is usually also being used concurrently it is the practice to insert the catheter through the airway. Thus, the airway acts generally as a guide for the catheter as it is inserted. However, airways presently in use have an inherent disadvantage and limitations.

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The problem associated with prior art airways is that as a catheter is fed into the device it tends to snake between the interior sides of the device. As this occurs, when the walls of the catheter approach both sides of the airway, the hollow interior of the airway becomes substantially blocked, occluding the air passageway. Further, if the catheter snakes as it is initially fed into the airway, the angle of its forward end passing through the airway and into the patient's throat may cause it to scrape the lining of the patient's throat and pharynx resulting in injury and possible bleeding.

10 The aforementioned disadvantages of an airway in not providing sufficient directional stability of a suction catheter during insertion and the snaking effect resulting in occlusion of the passageway is potential with all sizes of airways and catheters. Generally, the airways are sized according to the patient. For example, sizes for large adults and new borns with a range of intermediate sizes are usually available. Likewise, various catheter sizes may be obtained for use in cooperation with the airways. It will be appreciated that the smaller the catheter, usually the more flexible it is which flexibility may cause the snaking effect to be more pronounced with concomitant dangers.

20 The airway of the present invention is designed to substantially eliminate the disadvantages of the Guedel type previously used. The airway of the invention is provided with a plurality of ribs extending along the interior length of the elongated arched conduit portion. These cooperating ribs form a plurality of channels for directing an inserted catheter and for maintaining its position within the airway during use. At the same time with the catheter so positioned, the remaining portion of the conduit is open and unobstructed. Further, the direction of the end of the catheter traveling from the airway into the patient's throat and pharynx is maintained thereby substantially decreasing potential accidental injury to the patient as previously described. These and other advantages of the invention will be evident to those skilled in the art from the following detailed description.

Figure 1 is a top plan view of the airway of the invention:

Figure 2 is a side sectional elevation of the airway of Figure 1

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taken along line A-A thereof:

Figure 3 is a full view in perspective of the airway:

Figure 4 is an elevational view of the forward opening of the airway;

Figure 5 is a view in perspective showing a suction catheter inserted in the airway: and

Figure 6 is a perspective view of a bite insert used with the airway of the invention.

Referring to Figures 1-3 the airway 10 comprises an elongated arched conduit portion 12 having a forward opening 18. A hollow neck portion 14 is connected to the end of the arched conduit portion 12 and extends rearwardly therefrom. A flange portion 16 is located on the end of the neck portion 14. The flange portion 16 is flattened with the plane of its flattened surfaces being substantially perpendicular to the common axes of the neck and conduit portions 14 and 12 respectively. The hollow neck portion 14 provides a passageway 52 terminating at the exterior end 28 of the device with the passageway 52 also communicating with the cavity 30 of the conduit portion 12.

The conduit portion 12 is arched along both its upper surface 20 and lower surface 22 so that it generally conforms to the arch of a patient's tongue and upper pharyngeal region.

As also shown in Figure 4, the conduit portion 12 of the airway is provided with a plurality of ribs, 24, 25, 26 and 27 which extend along the interior length of the conduit portion 12. Upper ribs 26 and 27 extend along the upper interior conduit surface while lower ribs 24 and 25 extend along the lower interior surface of the arched conduit portion 12. It will be noted that each upper rib is disposed substantially opposite a lower rib and cooperating with conduit sides 45 and 47 to form channels 42, 44 and 46 extending along the length of the arched conduit portion 12.

Noting particularly Figure 1 and 4, channels 46 and 42 extend along the sides of the conduit portion bounded by the respective interior side of the conduit portion 12 and the sides of the respective ribs. A third channel 44 is centrally located bounded generally by the sides of the four cooperating ribs as shown.

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The cross-section shape of the conduit portion 12 and the neck portion 14 is generally ~~ellipsoidal~~ with the upper and lower conduit surfaces 20 and 22 and the neck surfaces 13 and 15 respectively being somewhat flattened. Accordingly, the cross section shape of the neck portion 14 and arched conduit portion 12 including the rear and forward airway openings 28 and 19 will be a modified or somewhat flattened ~~ellipsoidal~~ shape which may be referred to as a prolonged or an elongated spheroid.

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The preferred device incorporates the two pairs of upper and lower ribs as shown in Figure 4. Thus, the device as shown incorporates a cavity 30 through the arched portion 12 into which cavity the ribs extend to form the three channels 42, 44 and 46 as shown. However, different number of opposing ribs may be used, for example, one upper rib and one lower rib substantially opposed so as to create two channels, one being on each side of the upper and lower ribs. Similarly, three or more ribs, upper and lower could be used if more channels are desired.

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As previously noted, the ribs cooperate to form the channels along the arched conduit portion 12 of the airway which channels act as a guide for a catheter inserted into the airway. Referring to Figure 5 there is illustrated a catheter 32 extending through the airway 10. It will be noted that the catheter 32 extends along the center channel 44 which is defined by the cooperating ribs. Thus, even though the catheter 32 fills a large portion of that channel 44, the two channels 42 and 46 remain open and unobstructed thus assuring a sufficient passageway for air to and from the patient's lungs.

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It will be noted that opposing ribs, i.e., ribs 24 and 26 extend substantially into the cavity 30 of the conduit section 12. The projection of these opposing ribs toward one another is only critical in that they should protrude far enough so as to prevent a rather small catheter from slipping between them in which the catheter would be located in two or more of the channels defeating an object of the invention. The opposite ribs could even contact or be formed as a single rib which would thus act as a separator or divider for the channels.

As shown the ribs do not extend into the neck of the airway. That feature is desirable since a bite block such as shown in Figure 6 is desirably used with the airway as will be more fully explained hereinafter.

The specific shape of the conduit portion 12 is not extremely critical but as previously pointed out should generally conform to the shape of the arched tongue and downwardly directed passageway from the back of the patient's mouth into the esophagus and upper pharyngeal region. It is especially desirable that the forward edge 18 of the airway be rounded to avoid any sharp edges which may injure a patient when the airway is inserted. In addition the device is preferably made of a soft and rather flexible plastic such as a polyvinyl chloride or polyvinyl acetate. Although materials such as polyethylene and polypropylene could be substituted such plastics are usually somewhat harder and thus do not offer as much patient comfort as the softer and more flexible materials. However, these materials are by way of example only and the device is not limited to specific plastics except by way of preferred relative softness.

Figure 6 illustrates a bite insert 36 preferably used in cooperation with the airway previously described. The bite insert 36 comprises an elongated hollow conduit provided with upper and lower opposed ribs 33, 34, 37 and 38 projecting inwardly as shown. In using the bite insert 36 with the airway, it is inserted into the passageway 52 of the hollow neck portion 14 of the airway 10. Since the preferable airway composition is rather soft unless it is somehow enforced, a patient may bite down on the neck portion 14 causing occlusion of the passageway 52 and suction catheter. This undesirable feature is obviated by using the bite insert 36 made of a rather hard material such as rigid polyethylene, nylon or similar material. The outer surface of the bite block is shaped so that it will nest snugly within the interior of the hollow neck portion and provide reinforcement around its surface area.

The interior of the bite insert 36 is provided with the ribs extending along a portion of the length of the upper and lower interior surface. The ribs are formed so as to be aligned with the ribs of the conduit portion

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of the airway to provide continuous channels through the bite insert and airway for guiding an inserted catheter. It is preferable to have the ribs extending from only one end of the bite insert and approximately one-half of the length of the conduit which leaves the other conduit half unencumbered. This feature is desirable in order to allow for insertion of an airway connecting device into the portion of the bite insert conduit or tube which portion does not incorporate the ribs.

These as well as other advantages of the invention described herein will be evident to those skilled in the art.

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THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE  
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An improved breathing aid device for insertion in the mouth and pharynx comprising an elongated tubular hollow body open at each end which body has a straight portion for extending through the lips and mouth and an arched portion for extending over the tongue and into the pharynx, the hollow interior having at least one pair of ribs extending along at least a portion of the interior length of the tubular body to define elongated channels for guiding a catheter therealong.
2. A device according to claim 1 wherein the ribs extend substantially along the length of the arched portion.
3. A device according to claim 1 wherein the interior has only one pair of ribs and wherein one rib of said pair of ribs is disposed opposite the other rib of said pair.
4. A device according to claim 1 wherein the arched portion is generally of elliptical cross-section having substantially similar opposed upper and lower interior surfaces from which the ribs project.
5. A device according to claim 1 including a flange attached to the end of the straight body portion.



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6. A device according to claim 1 wherein the arched portion has generally flattened upper and lower interior and exterior surfaces and curved sides, and wherein two pairs of ribs are provided, one rib of each pair extending along the flattened interior upper surface and the other rib of each pair extending along the flattened interior lower surface, the ribs being disposed so as to define three interior channels within the hollow body.

7. In combination the device according to claim 1 and an elongated hollow reinforcing member inserted in the straight body portion and having an outer surface in substantial abutment with the interior surface of the straight portion.

8. A combination according to claim 7 wherein the interior of the hollow reinforcing member includes at least one pair of ribs substantially aligned with the ribs of the interior of the tubular body and which ribs extend along a portion of the length of the reinforcing member interior.

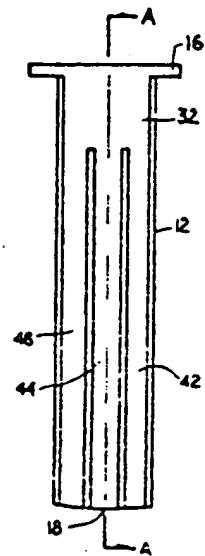


FIG. 1

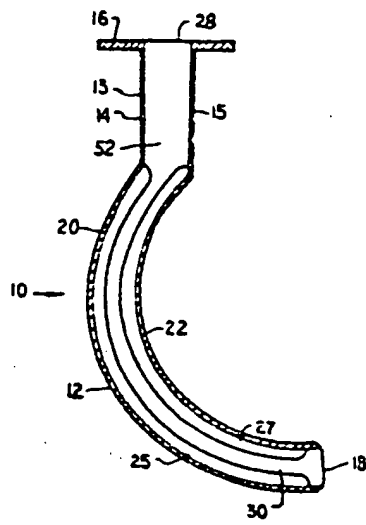


FIG. 2

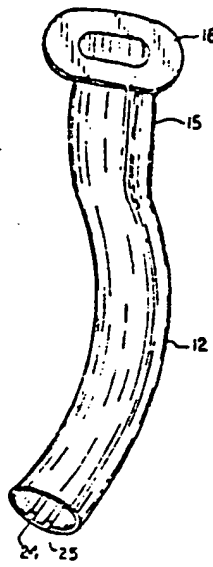


FIG. 3

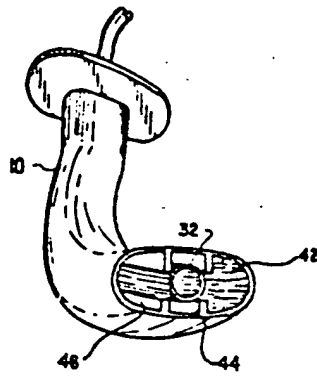


FIG. 5

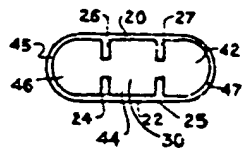


FIG. 4

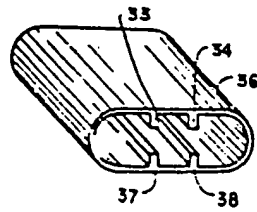


FIG. 6